ADMINISTRATION REPORT OF MILITARY WORKS

LIBRARY OF THE BOMBAY BRANCH OF THE ROYAL ASIATIC SOCIETY.

OF THE

PUBLIC WORKS DEPARTMENT,

BOMBAY PRESIDENCY,

FOR THE YEAR

1889-90.

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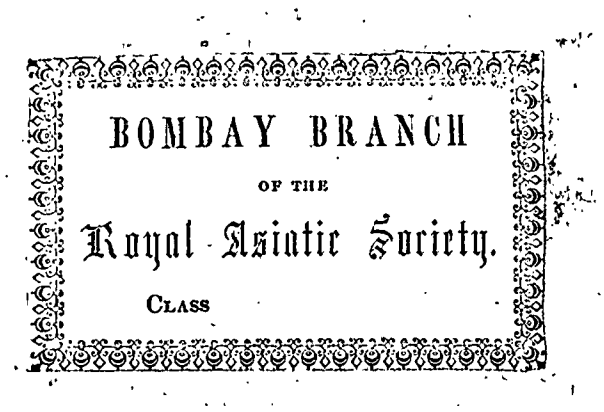
Bombay:
PRINTED AT THE GOVERNMENT CENTRAL PRESS.

1890.



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N.B.—The figures printed in italics in this Report do not necessarily agree with the Finance Accounts of the year prepared by the Examiner, whose books are not yet closed. They are the best approximates available at the date of submission of this report.

ADMINISTRATION REPORT

OF THE

PUBLIC WORKS DEPARTMENT,

BOMBAY PRESIDENCY,

FOR THE YEAR 1889-90.

MILITARY WORKS.

GENERAL REMARKS.

1. During the year an important administrative change was carried out under the orders of the Government of India, whereby the control of the military works at the principal military stations was transferred, from the Bombay Public Works Department, to the Military Works Department, under the orders of the Inspector-General of Military Works, Simla.

2. The transfer, which was effected in January 1890, has so far been carried out at the following stations :—

Bombay District.

Bombay, including Devláli.

Aden District.

Aden.

Poona District.

Poona and Kirkee.

Sind District.

Karáchi, | Hyderabad,
Jacobabad.

The following stations remain under the control of the Bombay Public Works Department :—

Poona District.

Ahmednagar, Sirúr, | Purandhar, Khandála,
Sátára.

Bombay District.

Málegaon, Bhúj, | Baroda, Surat,
Thána.

Deesa District.

Ahmedabad, | Rájkot.

The military works at Belgaum, which is garrisoned by Madras Troops, also remain in the charge of the Bombay Public Works Department.

3. The transfer not having been effected until towards the close of the year, this report has been compiled, as usual, under the orders of the Bombay Government.

4. *Bombay.*—Various questions of great importance, affecting the accommodation for troops, and military and naval establishments in Bombay, were under consideration during the year, and may be briefly alluded to under the following heads :—

1. The recommendations of the Extension Committee affecting the location of the troops and military and naval establishments.
2. Accommodation for European troops at Colába.
3. The accommodation for Warrant Officers.

Under the first of these heads, the more important of the recommendations made by the Extension Committee were :—

(*a*) That the Native Infantry Regiments now located on part of the Marine Lines Estate and at Bori Bandar, and the Executive Com-

missariat Office, should be transferred to sites to be reclaimed from th e sea on both sides of the Colába promontory.

(*b*) That the Dockyard, Arsenal, and Gun Carriage Factory be removed to Hog Island, on the other side of the harbour.

5. The first of these two recommendations has been enquired into and reported upon by a Special Committee, and by the officers concerned, and the matter, with complete proposals for the utilization of the space which would be set free, is now under the consideration of the Government of India.

6. The subject of the transfer of the Dockyard, Arsenal, &c., to Hog Island was brought to the notice of the Government of India before the receipt of the Committee's report, the Government of Bombay considering that, in view of the great desirability of such a move on general grounds, the subject should be fully reconsidered before deciding to incur the heavy expenditure contemplated for the provision of a new dry dock as an addition to the existing Dockyard. The conclusion arrived at by the Government of India was, however, that in the present condition of the finances, whatever may be the ultimate decision, there is little prospect of the transfer being carried out for many years to come.

7. The project for accommodation for European troops at Colába underwent thorough revision, both as respects the single men's barracks and married quarters. As regards the former, the project sanctioned in 1885 was for the construction of 7 upper-storeyed barracks, accommodating 28 serjeants and 504 men, of which 5 were to be on the plinths now occupied by semi-permanent barracks, which were to be removed, and 2 were to be one on each flank of these 5. These last 2 barracks have been already built, but, during the year, revised proposals were submitted and sanctioned, whereby the existing 5 semi-permanent barracks, which are in excellent order, and likely to remain serviceable for many years, are to be retained, and three new barracks are to be built on another site, west of the Colába road. Originally, for the sum of Rs. 9,10,365, it was proposed to accommodate, in all, 28 serjeants and 504 men, or a total of 532. The revised arrangement provides, at a cost of Rs. 8,40,083, for 20 serjeants and 432 men in 5 new barracks, and in addition leaves available the existing 5 semi-permanent barracks, which accommodate 10 serjeants and 200 men, making a total of 662. This revision thus provides largely increased accommodation—a point of great importance—at a considerable reduction in expenditure. The revised proposals, after thorough discussion, were sanctioned by the Government of India in December 1889. Tenders for the construction of 2 of the new barracks and their subsidiary buildings, which had been called for in anticipation, were sanctioned in November 1889: in January 1890 the works were transferred to the control of the Inspector-General of Military Works.

8. The project for new married quarters, originally submitted in 1885, provided for 55 men in 5 blocks, at a cost of Rs. 3,80,703, or Rs. 6,922 per quarter. On reconsideration, it was decided to considerably reduce the number of new quarters—those now occupied by the Royal Artillery being of semi-permanent construction, in good order, and sufficient for present requirements. The present family quarters of the European Infantry, on the other hand, are of very wretched construction, having low roofs, wattle and daub walls, mud floors, and low plinths, and require constant repair to keep them even habitable, and new quarters are very urgently required. The plans and estimates, submitted to the Government of India in December 1889, provide for 20 quarters in two upper-storeyed blocks: the estimated cost is Rs. 1,35,653. The Government of India, in January 1890, sanctioned the work being undertaken at once, subject to such revision as the Inspector-General of Military Works may deem necessary—the works having in the meantime been transferred to his control.

9. The question of the provision of suitable quarters for the Warrant and Non-Commissioned Officers attached to the several departments in Bombay is one which had received a large amount of attention in previous years, but any practical action in the matter was delayed, owing to the difficulty of obtaining a suitable site. In the meantime the establishments are accommodated partly in quarters forming part of the old Town Barracks, partly in temporary structures near the Crawford Market, partly in hired quarters in the town. During the year a satisfactory solution of the question, as regards the provision of quarters for Warrant Officers of the Ordnance Department, was arrived at, it having been decided to build a block, consisting of a ground and 3 upper floors, and containing accommodation, according to standard, for 16 Warrant Officers, on the site of the old Sanitarium Hospital at Colába. The estimate amounts to Rs. 1,30,794, and there will be a saving in rent of

nearly Rs. 18,000 per annum when the quarters are ready. The building has been designed in such a way as to admit of a second block of the same size being hereafter erected in the same compound. The site is on the sea-shore, with a north-west aspect, the best or nearly the best for Bombay, and the rooms, according to the design sanctioned by this Government, are in a single row, and not back to back, and there is thus free through perflation. The project was sanctioned by the Bombay Government on 1st March 1889, but the commencement of the building was delayed under orders from the Government of India, whose final approval was not received until the end of April, or too late for anything to be done before the monsoon. Tenders were called for and accepted, under the orders of this Government, in September 1889, and in January 1890 the work was transferred, with the other military buildings in Bombay, to the control of the Inspector-General of Military Works; the design, it is reported, has since been revised under that officer's orders, by the addition of four quarters, at the back of those in the original plan.

10. In May 1889, the Government of India, in the Military Department, intimated to this Government that they had decided to undertake the construction of a Wet Basin in the Dockyard at Bombay, for the accommodation, more especially, of the torpedo boats, but also of other craft belonging to the Indian Marine; and that the work was considered very urgent, and would be undertaken as a special defence work. A Committee representing the various interests affected by the construction of the basin was assembled, and in September 1889 submitted their report, which was forwarded to the Government of India with this Government letter No. 272 M. W.—1805, dated 22nd October 1889. The matter now awaits the orders of the Secretary of State.

11. The expenditure under the head Military (including Contributions), in 1889-90, amounted to Rs. *13,91,569*, of which Rs. *4,96,614* was for Original Works, Rs. *5,34,364* for Repairs, Rs. *2,32,298* for Establishment, Rs. *14,841* for Tools and Plant, Rs. *20* for Profit and Loss, and Rs. *1,30,988* for Barrack Department, after deducting from the total Rs. *7,556* for decrease under suspense accounts.

12. The record of the operations of the year under each head, at each station, is as follows:—

1.—ACCOMMODATION FOR TROOPS.

Buildings for European Troops in the plains.

Bombay.

13. The two new barracks at Colába, alluded to in last year's report, one on the north and one on the south flank of the Artillery Lines, east of the Colába road, were occupied before last monsoon. The foundations and plinths of two of the upper-storeyed barracks on the west side of the Colába road are nearly complete. The expenditure during the year was Rs. 47,812, and the amount of total outlay on the work Rs. 3,72,049, out of an estimate of Rs. 8,40,083.

Devláli.

14. One of the matters which attracted attention when an enquiry was held, in 1866-67, regarding the sanitary condition of Devláli, was the excessive overcrowding in cells; and the Government of India approved of a project being prepared for an additional block of cells and an extra detention room. The project was accordingly prepared, but its execution was delayed for want of funds. During the year, the difficulty was, however, got over, and funds to the extent of Rs. 4,000 provided for one block of 15 cells, estimated to cost Rs. 18,998. The foundations of the cells have been put in, and certain materials collected; the outlay during the year having been Rs. 2,271. To make room for the cells it was necessary to divert a piece of the Bhágur road running through the Cantonment; this has been completed.

15. The erection of certain buildings for a Soldiers' Institute at Devláli was commenced during the year. The scheme consists in constructing a billiard room, and making additions and alterations to barracks Nos. 5 and 6, and enclosing them with a fence or palisading, to adapt them for a theatre, games-room, reading-room, waiting-room, library and refreshment-room. This work has been pushed on quickly, and the alterations to Nos. 5 and 6 barracks were completed in time to admit of their being used during the trooping season. The billiard-room has been floored and roofed in, and except for the painting, is nearly completed. The iron work for the railings was obtained from Bombay; and these are now being erected. The alterations to the barracks consisted chiefly of partitions and enclosure walls, and No. 5 now provides a reading-room, games-room, waiting-room and library, with quarters for a serjeant in charge, while No. 6 is used as refreshment and supper room. Certain outbuildings of No. 5 barrack have been removed. The estimate amounts to Rs. 21,901, of which Government contributed

Rs. 3,000, the balance Rs. 13,478 being met from regimental funds. The expenditure in the year was Rs. 10,374, namely Rs. 3,000 from Government, and Rs. 7,374 from contributions.

Kirkee.

16. Accommodation for an additional Field Battery of Artillery at Kirkee being needed, the question as to how this should be provided, at a minimum of expenditure, having been duly considered, it was decided that this could best be done by adaptation of certain existing buildings, as follows:—Two buildings, originally designed as barracks, but now used as recreation rooms and gymnasium, were to be re-appropriated for barracks, providing accommodation, at full space, for 64 men; the building used as a canteen to be converted into the recreation department; a refreshment department to be built; and the gymnasium to be in the open air, or under an open shed. Detailed plans and estimates for giving effect to these proposals were accordingly drawn up, and amounted to Rs. 34,478 only, of which Rs. 24,736 was for a building for the refreshment department, and Rs. 7,415 for a new temperance room and alterations to the canteen, &c. The work has been in progress during the year as follows:—

The new building for the refreshment department, which consists of a refreshment room, 93′ × 24′, beer store, 24′ × 24′, issue bar, 18′ × 24′, corporal's room, 11¼′ × 12′, coffee shop, 24′ × 24′, and 2 rooms for small stores for coffee shop, each 11¼′ × 10½′, has been constructed. The building is sheltered all round by a verandah, 9 feet wide.

A new building for a temperance room, consisting of a room, 42′ × 24′, with an open verandah on three sides, the verandah on the south side being enclosed so as to form three small rooms for coffee stores, &c., has been built.

The old barrack No. 152 at Kirkee, which was used for some years for a gymnasium, has been again utilized for a barrack, to give increased accommodation for 32 men. The alterations effected to the building consist of paving the floor of the main room, filling up shelves, pegs, and arm racks, and glazing the upper portion of the planked windows to admit more light.

The lavatories for barracks Nos. 152 and 154, being situated at a distance, 4 small ablution rooms, in the corners of the verandahs, have been fitted with portable basins, and water laid on, with pipes and brass cocks complete.

The old cook-room, close to the new refreshment department, has been put into good order, by repairing the chulas, paving the floor, and renewing the decayed stone kerbing in the verandah.

The old fittings removed from the building used as a lavatory in former years, have been refixed in position; 8 new copper basins supplied, and a small portion of the pavement taken up and relaid.

An old latrine, with sweeper's shed, situated at a considerable distance from barrack No. 152, has been dismantled, and rebuilt in a more convenient position for the men using it.

The floor of the cook-room has been paved, the chulas repaired, and the decayed stone kerbing in the verandah renewed.

And an urinal-shed for both barracks has been constructed on the standard plan.

The outlay during the year has been Rs. 28,155.

17. In 1885, when an extra Battery of Artillery was ordered to Kirkee, the horses were housed in temporary stables, at a cost of Rs. 7,231. In place of these it was intended eventually to build proper iron stables, and, in June 1888, His Royal Highness the Commander-in-Chief was of opinion that the question was one of great urgency, and a sum of Rs. 17,458 was re-appropriated towards constructing the new stables; but the project was deferred, under the orders of the Government of India, pending the consideration of several alternatives for the location of the battery, which point was not settled till March 1889. In the meantime the state of the temporary stables had become most critical, and they had to be condemned as unsafe, and vacated, the horses being picketted in the open. The necessity for the erection of the new stables, without delay, became, therefore, pressing, and funds were provided for the immediate commencement of the work, in June 1889, by re-appropriation.

The stables are in two ranges for 56 horses; each range is 196 feet long, and 34 feet wide from centre to centre of columns, and the roof projects 6 feet beyond the columns; each horse has a space 14 feet in depth and 7 feet in width. The columns are braced by lattice girders. There is a central passage, 6 feet in width, formed by teak planks and posts, 2¼ feet wide. The total height of the stable is 18¼ feet above ground level to top of roof, and the height of the columns 10¼ feet. A continuous ridge ventilator is provided in the roof, and the segmented ends are enclosed with corrugated iron sheeting secured to angle iron stays. The floor is of moorum well consolidated. The columns are of cast iron, the lattice girders, ribs, tie and suspension rods are of wrought iron, purlins of channel iron, roof covering curved corrugated iron sheeting, 19 B. W. G. Teakwood mangers have been provided for each horse. The work has been completed at an outlay of Rs. 23,313.

18. With a view to remedy the unhealthy state of the barracks occupied by European Infantry at Ghorpuri—one of the causes of which was the want of proper drains to carry off waste water from lavatories and cook-rooms, which consequently soaked into the surrounding ground, and which the Sanitary Commissioner considered was a fertile source of disease, and probably the most important factor in rendering these barracks unhealthy—plans and estimates for shallow masonry gutters to carry the water to a safe distance from the barracks, and utilize it for cultivation purposes, were called for. Three alternative estimates were prepared and submitted for different classes of drains, and of these the estimate for cut-stone drains, amounting to Rs. 9,328, was approved and sanctioned, and funds provided for their construction; during the year, 1,200 running feet of drain have been completed, and materials collected for about 1,000 feet more; the expenditure having been Rs. 1,806. Poona.

19. An infant school for Royal Artillery, 40′ × 20′, with a verandah 8 feet wide in front and rear, estimated to cost Rs. 3,136, is being constructed to accommodate 50 to 60 children. The superstructure has been raised 7 feet high during the year under report, during which the outlay has been Rs. 2,001. Kirkee.

20. The old canteen of the British Infantry Barracks at Ahmednagar has been converted into an Institute, by doubling its former size. It consists of one large refreshment room, 80′ × 24′, coffee shop, 24′ × 20′, corporal's room, 25′ × 12′, issue bar room, 24′ × 12′, shop store, 20½′ × 8′, pantry, 12′ × 8′, beer store, 28′ × 8′, small store, 12′ × 7½′, and cashier's room, 8′ × 5½′, with a verandah in front, 110′ × 8½′. The work has been completed at a total expenditure of Rs. 9,235, against the estimate of Rs. 10,033. Some minor improvements have also been made to the Regimental Institute to complete its requirements. Ahmednagar.

21. Six new detached wash-houses have been constructed between the lines of the British Infantry Barrack rooms, each complete with 2 tables for 14 basins, and 6 bath-rooms, fitted with 2 iron water tanks and distribution pipes, with brass spring push cocks, at a total expenditure of Rs. 12,224, against the estimate of Rs. 14,415. This work was nearly completed.

22. The 6 roofs of the rear range of the British Infantry Barracks, and the roof of the Serjeants' Mess and Soldiers' Recreation Room have been thoroughly overhauled, by removing all the tiles, replacing the old matting with new, renewing all rotten and defective rafters, repairing all squared timber in the trusses and purlins, and retiling, the deficiency of tiles being made up by new ones. The amount of the estimate is Rs. 6,831, and the total expenditure has been Rs. 6,596.

23. During the year the new iron stables, consisting of two stables, 128′ × 46′, and one stable, 140′ × 46′, for 112 horses, and auxiliary buildings, for the Royal Artillery, have been partly constructed. The foundations have been filled in, and all iron pillars with side girders fixed; and the materials to complete the whole have been received. A forge and shoeing shed and gram shed have also been completed. The infirmary has been about half done, the superstructure, floors, and frame work of the roof being finished. The whole is expected to be ready for occupation by the 15th June 1890. The amount of the sanctioned estimate was Rs. 37,987, and the expenditure of the year has been Rs. 28,688.

24. The new barracks at Steamer Point, for the accommodation of 2 Batteries of Royal Artillery, have made considerable progress. Aden.

The blocks for 2 single men's barracks, family quarters, and staff serjeants' quarters are under construction; and a new road of approach to the

barracks is nearly completed. Rs. 1,66,776 have been expended approximately.

25. Re-roofing 2 of the barracks occupied by the European Infantry Regiment at the Crater, had been commenced, and a new supper-room added to the canteen premises.

BUILDINGS EXPECTED TO YIELD A RETURN ON THEIR OUTLAY.

Bombay. 26. It being found impracticable to flush effectively the house connections of the officers' quarters in the Marine Lines, and the ventilation of the drains being defective, automatic flushing tanks, 3′ × 3′ × 3′, have been provided at the head of each system of drains. Cast-iron ventilating pipes have also been provided at convenient intervals. The cost of the work has been Rs. 3,287.

27. The sanitary arrangements of the new permanent officers' quarters have been improved, at a cost of Rs. 1,736.

BUILDINGS FOR NATIVE TROOPS.

Bombay. 28. The old servants' quarters, in the compound of the Native Station Hospital in the Marine Lines, have been removed, and 2 new blocks, providing the accommodation required, have been erected on a more convenient position, at a cost of Rs. 2,688.

Poona. 29. Additions and alterations to the Native Infantry Centre Flank Hospital at Poona have been carried out during the year. The old floor of the hospital has been removed, and a cement and concrete floor substituted; the old thatched roof has also been removed, and a permanent roof substituted; and the necessary alterations have been made to the walls, and the ventilation improved by providing 9 clerestory windows. The actual outlay has been Rs. 5,749.

Aden. 30. New Lines for a Native Infantry Regiment at the Crater were commenced during the last 3 months of the financial year; and 4 double quarters for the Native Officers were nearly completed by the end of the year, at a cost of about Rs. 15,000.

Kirkee. 31. Buildings required by the corps of Sappers and Miners at New Jhánsi, Kirkee, estimated to cost Rs. 23,557, were commenced during the year. These consist of company store-rooms, printing and lithographic school and store, gun-cotton and gunpowder magazine and fuze store, and small arms ammunition magazine.

The whole of the buildings have been nearly completed during the year under report, in which the outlay amounted to Rs. 16,937.

32. Quarter guard and subsidiary buildings for Native Infantry at New Jhánsi, estimated to cost Rs. 16,643, were commenced during the year. These buildings comprise:—Quarter guard for 1 havaldár and 14 men, solitary cells, armourers' shop, magazine, sentry boxes, and latrines. All the buildings are in accordance with the standard plans, and were nearly completed during the year; only the sentry boxes, half the latrines, and some minor fittings remaining to be completed.

Sátára. 33. In consequence of the insanitary and dilapidated condition of the Hospital building for the Native Infantry Regiment quartered at Sátára, plans and estimates for a new building were prepared and duly sanctioned, and the work was commenced in October 1889. The buildings, estimated to cost Rs. 20,056, comprise a hospital, quarters for 2 Hospital Assistants, a guard room, quarters for hospital servants, and the necessary out-houses. The outlay during the year was Rs. 9,734. The buildings are expected to be ready for occupation early in June 1890.

2.—ORDNANCE WORKS.

Bombay. 34. Quarters for Warrant and Non-Commissioned Officers attached to the Arsenal at Bombay, the revised estimate for which amounts to Rs. 1,30,974, were commenced in October. The quarters were originally intended to provide for 16 Warrant Officers, but the number has been increased to 20 in the revised design. The building is to consist of 4 floors, and 5 families will be accommodated on each floor. During the year the ground floors have been constructed, and the walls carried up to the height of the first floor. The outlay has been Rs. 34,978.

Kirkee. 35. Quarters for Warrant and Non-Commissioned Officers of the Small Arms Ammunition Factory at Kirkee have been in progress during the year

The second block of quarters for 2 conductors, reported during 1888-89 as having the superstructure raised 8 feet high, has been completed; also one additional block for 2 sub-conductors commenced and completed during the year.

Poona. 36. Huts for lascars, &c., of the Ordnance Depôt at Poona were under construction by the Ordnance Department, departmentally, during the year. The estimated cost is Rs. 4,000, and 2 blocks of quarters, to accommodate 14 men each, have been completed at an expenditure of Rs. 1,498.

Kirkee. 37. Additions and alterations to the Small Arms Ammunition Factory at Kirkee were in progress as follows :—The existing moulder's shop has been appropriated for a machine room, and a new moulder's shop, 35′ × 23′, has been constructed, in prolongation of the existing shop. The existing blacksmith's shop has been appropriated for a machine room, and a new blacksmith's shop, 40′ × 25′, has been erected in its stead. A chimney has been constructed for the new boiler room; it is 70 feet high from ground level, built of table moulded brick and lime, and lined with fire-brick, laid in fire-clay, to a height of 16 feet. A boiler room, 43′ × 30′ 9″, for seating 3 boilers, has been commenced, and the superstructure raised 15 feet high during the year. The outlay during the year has been Rs. 12,015.

Karáchi. 38. No major works have been constructed or in progress during the year. A new Powder Magazine was sanctioned, at an estimated cost of Rs. 21,223, but owing to the unsuitability of the site originally selected, the work was suspended.

7.—GENERAL CANTONMENT WORKS.

Drainage.

Baroda. 39. The drainage of the Cantonment and Sadar Bázár at Baroda, which has been described in previous reports, was completed during the year, at a total cost of Rs. 27,029; the expenditure during 1889-90 having been Rs. 4,750.

Water-supply.

Kirkee. 40. In March 1888, the Quarter Master General addressed an urgent letter to Government, asking for sanction to an estimate, amounting to Rs. 11,951, for laying on a water service for the new Native Infantry lines, representing that the present supply is barely sufficient for the Sappers and Miners, and that it was, therefore, imperative it should be supplemented. The estimate submitted was an old one, prepared in 1885, which provided merely for increasing the size of the branch leading from the Yerrowda main, and extending the distribution to a cistern to be erected in the new Native Infantry lines. The Chief Engineer, on being referred to, represented that this estimate required revision, as by simply enlarging the branch pipe, the supply to Yerrowda would be affected, and that what was required was a larger main, as well as larger branch pipes, &c. The estimate was revised accordingly, and amounted to Rs. 23,679, and provided for an enlargement of the main, and, in fact, for a considerable extent of new main, which would, in addition, serve about 15 houses that had at that period no supply at all, or a very indifferent one, led from long distances. It was further proposed to connect the end of the Mutha Canal main by a line of 3″ pipes, running across Holkar's bridge, with the Pashan main supplying Kirkee. This latter proposal led Government to suggest that the supply should be met by an extension of the Pashan system, rather than by the extensive re-arrangement of the Mutha Canal mains and system proposed by the Chief Engineer, and an alternative estimate was called for. This amounted to Rs. 11,375, or less than one-half the previous estimate. The estimate was subsequently revised, to allow of the supply to the Sappers and Miners being also drawn from Pashan, by extending the 4″ main, raising the figures to Rs. 11,785, and to these Rs. 2,318 were added for a cistern to hold 30,000 gallons, thereby increasing the total estimated cost to Rs. 14,103. By this arrangement the cost of the work would be borne entirely by Imperial Military funds; and as the Pashan reservoir was built from that source, the water will be supplied free, which would not be the case if the supply was taken from the Mutha Canal, a work constructed from Imperial Irrigation funds. Funds having been provided in the past year, the cistern has been completed, with the exception of the roofing; the 4″ and 3″ mains have been laid, and the 2½″ main supplying the Pioneers' Lines, except as regards fire-plugs, which are now in hand. The outlay has been Rs. 12,242.

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Aden. 41. Some important repairs to a large well in the Kussuf Valley had been undertaken; and a new building for the condensers at Steamer Point been nearly completed, but the boilers and condensing machinery from England were awaited.

8.—FORTIFICATIONS.

Ahmedabad. 42. The Fortified Post at the south-east corner of the Cantonment, fully described in former reports, has been completed, at a total cost of Rs. 88,632.

Sátára. 43. In connection with the improvements to the Hill Fort at Sátára, a large arm ammunition magazine and a gun and limber shed were constructed during the year, lightning conductors were provided to the barracks, officers' quarters and guard room, and the loop-holed screen walls at commanding angles of the fort, were built, so far as the funds available for the year would admit. The total outlay to the end of the year amounted to Rs. 22,961, against the sanctioned estimate of Rs. 27,161. The works remaining to be carried out are (1) the completion of the screen walls, and (2) the construction of the postern entrance.

9.—DOCKYARD AND NAVAL BUILDINGS.

Bombay. 44. A double-storeyed godown in the Dockyard was completed at a cost of Rs. 75,081, and handed over in July last. It is an upper-storeyed building, 262 feet long, and 36 feet wide, the height of walls of rooms being 16 feet.

45. The greater part of the work of providing internal fittings to the new store godowns in the Dockyard was carried out by the Dockyard authorities, and has been completed during the year. Shelves, supported on iron brackets, have been put round the walls of the upper storey, while strong platforms, supported on posts and joists, have been provided in the lower storey. The expenditure was Rs. 10,812.

46. The office of the Examiner of Marine Accounts having been transferred from Calcutta to the Bombay Dockyard, and accommodation not being available elsewhere in any of the Government buildings at Bombay, arrangements were made to provide the required accommodation in the Dockyard, and this has been done by adding a room, measuring 40′ × 46′, to the building occupied as an account office, and more space has been obtained, by shifting the wooden partition at the opposite end of the account office and taking in part of the sailmakers' loft. The work was completed at a cost of Rs. 6,017.

REPAIRS.

Bombay. 47. With regard to the repair allotments, a good proportion of the allotments were spent on special work. In the lines occupied by the Marine Battalion, the wattle and daub walls of 19 pendalls were removed and half brick and lime walling substituted. This involved the renewing of a large number of posts, and cost altogether Rs. 3,160. At Colába the drains that were intended to carry off the water from the wash-houses were only of rough stone slab laid dry, and the water seldom ran more than 20 feet from the buildings. Semi-circular 6″ cement concrete drains have now been provided from the repair grant; these carry off the water, and can be kept clean regimentally. A great part of the Colába Station Hospital has been practically re-roofed, the ventilators being now covered with Mangalore tiles.

48. In 1887-88 Rs. 33,907 were paid in rents for hired quarters; in 1888-89, Rs. 39,487; but in 1889-90 this has been reduced to Rs. 34,445, by taking cheaper lodgings, and giving up the dearer ones as opportunity offered. In 1887-88 the average rate was, for a conductor, Rs. 96 a month; in 1888-89, Rs. 104; whereas now it is only Rs. 80.